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THE TEMPLETON CROCKER EXPEDITION OF THE  
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THE CYPERACEÆ\*

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I. GALAPAGOS ISLANDS

With the exception of three peculiar endemic species of *Cyperus* (*C. galapagensis*, *C. Anderssonii* and *C. rubiginosus*), only wide-ranging tropical sedges are found on the Galapagos Islands. Six new records for these islands [see notes following list of species] were made by the Crocker Expedition—a remarkable number, considering the extent of previous exploration. From the point of view of phytogeography, the species collected on the isolated humid summit of Mt. Crocker are interesting. I have in mind such wide-spread tropical plants of moist forests as *Rynchospora corymbosa*, *Scleria hirtella* and *S. pterota*, because they occur in a region surrounded on all sides by coastal deserts, and are at an altitude precluding the possibility of human introduction. Between this humid area of Indefatigable Island and the vicinity of the sea-coast itself, the *Cyperaceæ* seem to be almost wholly lacking, the scrub-covered, dry terrain evidently being not conducive to growth. Along the coast the sedges fall into three ecological groups: (1) those with strong, drought-resisting root-

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stocks, i.e., *C. ligularis* and *C. Anderssonii*; (2) annuals, i.e. *Fimbristylis annua* and *F. miliacea*, *Hemicarpha micrantha*, *Stenophyllus hirtellus*, *Eleocharis caribæa*, *Cyperus confertus*, *C. densicæspitosus*, *C. piceus*, *C. inflexus*, and probably *C. rubiginosus*; (3) species somewhat tolerant of salt water, i.e. *Cyperus lævigatus* and *Eleocharis fistulosa*. In the following list of *Cyperaceæ* known from the Galapagos Islands, it will be seen that *Cyperus* (15 species) and *Eleocharis* (6 species) are the largest genera:

<i>Cyperus Anderssonii</i> Boeckl.	<i>Eleocharis caribæa</i> (Rottb.) Blake
<i>C. caracasanus</i> Kunth.	<i>E. fistulosa</i> (Poir.) Link
<i>C. compressus</i> L.	<i>E. maculosa</i> (Vahl) R. and S.
<i>C. confertus</i> Sw.	<i>E. mutata</i> (L.) R. Br.
<i>C. densicæspitosus</i> Mattf. et Kükenth.	<i>E. nodulosa</i> (Roth) Schultes
( <i>Kyllinga pumila</i> Michx.)	<i>E. Sellowiana</i> Kunth ( <i>E. galapagensis</i>
<i>C. distans</i> L. f.	Svenson)
<i>C. esculentus</i> L.	<i>Fimbristylis annua</i> (All.) R. et S.
<i>C. grandifolius</i> Anderss.	( <i>F. laxa</i> Vahl)
<i>C. inflexus</i> Muhl.	<i>F. miliacea</i> (Thunb.) Vahl
<i>C. lævigatus</i> L.	<i>Hemicarpha micrantha</i> (Vahl) Britton
<i>C. ligularis</i> L.	<i>Rynchospora corymbosa</i> (L.) Britton
<i>C. polystachyus</i> Rottb.	<i>R. tenuis</i> Link
<i>C. rubiginosus</i> Hook. f.	<i>Scleria hirtella</i> Sw.
<i>C. surinamensis</i> Rottb.	<i>S. pterota</i> Presl
<i>C. piceus</i> Liebm. ( <i>C. tristachyus</i> Boeckl.)	<i>Stenophyllus hirtellus</i> (Schrad.) Standl.
<i>Dichromena radicans</i> Cham. et Schlecht.	

### **Cyperus Anderssonii** Boeckl.

*Cyperus Anderssonii* Boeckl. Linnæa 36: 334, 1869-70.

*C. brachystachys* (Hook. f.) Anderss., not Presl, 1820.

Unquestionably the most widespread sedge in the Galapagos Islands, often maintaining itself in dry rock crevices where there is practically no other vegetation. The numerous collections by the Crocker Expedition show admirably the great variation in length of rays.

### **Cyperus caracasanus** Kunth

*Cyperus caracasanus* Kunth, Enum. 2: 86, 1837.

Wreck Bay, CHATHAM ISLAND, *Howell No. 8579* (in part), with *C. esculentus*. Widely distributed in the tropics of both hemispheres. Not previously reported from the Galapagos Islands.

### **Cyperus compressus** Linné

*Cyperus compressus* Linné, Sp. Pl. 46, 1753.

Villamil, ALBEMARLE ISLAND, *Howell No. 8938*; Wreck Bay, Chatham Island, *Howell No. 8581*. A weedy, pan-tropical species, not before recorded from the Galapagos Islands.

**Cyperus distans** Linné

*Cyperus distans* Linné f., Suppl. Pl. 103, 1781.

Summit of Floreana Peak, CHARLES ISLAND, *Howell No. 9328*. Tropics of both hemispheres, not before recorded from the Galapagos Islands.

**Cyperus grandifolius** Andersson

*Cyperus grandifolius* Andersson, Kgl. Sv. Vet. Akad. Handl. 157, 1854.

Mt. Crocker, INDEFATIGABLE ISLAND, *Howell No. 9211*. The spikelets are compactly 10-20-flowered, whereas Andersson described them as remotely 6-10-flowered, but *No. 9211* agrees otherwise with Andersson's specimens at Stockholm and in the Gray Herbarium. The brown achenes are 2.0 mm. long, 0.6 mm. wide, with a lightly papillate surface. *Cyperus grandifolius* somewhat resembles a gigantic *C. strigosus*, but has a prominent horizontal woody rhizome 1 cm. thick, and except for *Lehmann No. 8431* from Colombia (possibly the same species) I have seen nothing approaching it. *C. galapagensis* Caruel, Rendic. Acad. Lincei, v: 621, 1889, is from description unquestionably *C. grandifolius*. Andersson's specimens of "*C. strigosus*" which I examined at Stockholm are *C. esculentus*, and so undoubtedly is Darwin's specimen from Charles Island.

**Cyperus rubiginosus** Hook. fil.

*Cyperus rubiginosus* Hook. f., Trans. Linn. Soc. 20: 178, 1847.

Probably nearest to the Hawaiian species, *C. trachysanthus* Hook. et Arnott, which likewise has prominent teeth just below the apex of the scale, and an arrangement of spikelets superficially like those of the Galapagos plants. The thick culms, drab (not red) scales, and large non-papillate, spongy-reticulated achenes of *C. trachysanthus* show, however, that the relationship is not very close.

**Dichromena radicans** Cham. et Schlecht.

*Dichromena radicans* Cham. et Schlecht., Linnæa 6: 38, 1831.

Villamil Mt. above Santo Tomas, ALBEMARLE ISLAND, *Howell No. 9000*. Reported by Stewart from CHATHAM ISLAND as *D. colorata* (Proc. Calif. Acad. Sci. ser. 4, 1: 43, 1911). The species is widespread in tropical America.

**Fimbristylis annua** (All.) R. et S.

*Fimbristylis annua* (All.) R. & S., Syst. 2: 95, 1817. *F. laxa* Vahl, Enum. 2: 292 1806.

The Crocker Expedition collections are undoubtedly the same as *F. diphylla* (Retz) Vahl, reported previously from HOOD ISLAND (Proc. Amer. Acad. 38: 129, 1902). According to Kükenthal's interpretation (cf. Fedde, Rep. Spec. Nov. 23: 195, 1926), which I am following, *F. diphylla* is the perennial form.

**Fimbristylis miliacea** (Thunb.) Vahl

*Fimbristylis miliacea* (Thunb.) Vahl, Enum. Pl. 2: 287, 1805.

Academy Bay, INDEFATIGABLE ISLAND, *Howell No. 9031*. A weedy tropical species of both hemispheres, not reported previously from the Galapagos Islands.

**Rynchospora corymbosa** (Linné) Britton

*Rynchospora corymbosa* (L.) Britton, Trans. N. Y. Acad. Sci. 2: 85, 1892.

Mt. Crocker, INDEFATIGABLE ISLAND, *Howell No. 9258*. Tropical regions of both hemispheres. Not recorded previously from the Galapagos Islands.

**Rynchospora tenuis** Link

*Rynchospora tenuis* Link, Jahrb. 3: 76, 1820.

Villamil Mt. above Santo Tomas, ALBEMARLE ISLAND, *Howell No. 9004*. Abundant in American tropics. Not recorded previously from the Galapagos Islands.

**Scleria hirtella** Sw.

*Scleria hirtella* Sw., Prodr. Veg. Ind. Occ. 19, 1788.

Mt. Crocker, INDEFATIGABLE ISLAND, *Howell No. 9220*. This widespread species was reported from INDEFATIGABLE ISLAND by Christophersen, Nyt Mag. for Naturvid. 70: 71, 1932.

**Stenophyllus hirtellus** (Schrad.) Standl.

*Stenophyllus hirtellus* (Schrad.) Standl., Field Mus. Pub. Bot. 8: 265, 1931.

All of the numerous specimens collected in the Galapagos Islands by the Crocker Expedition have pubescent culms, and therefore belong, at least provisionally, under *S. hirtellus*. The citations of *Fimbristylis capillaris* by Robinson (Proc. Amer. Acad. 38 (4): 129,

1902) and by Stewart should likewise be referred to *S. hirtellus*. Representative achenes (cf. Howell's *No. 9519*) are coal black when mature, averaging only 0.8 mm. in length, with an acute tubercle and a finely beaded-tuberculate surface, the prominences not arranged in obviously transverse lines; in *S. capillaris* the dull brown achenes average 0.9 mm., with flattened tubercles, and with a surface marked by shining transverse ridges and dull valliculæ.

## II. COCOS ISLAND

The *Cyperaceæ* of this little island are extremely few, the only species of interest being a *Hypolytrum* which forms enormous clumps, resembling stands of *Iris*, along the watercourses. This species I now believe is the same as a previously described Brazilian plant.

### *Hypolytrum Schraderianum* Nees

*Hypolytrum Schraderianum* Nees in Mart. Fl. Bras. 2: 65, t. 5, 1842. *H. nicaraguense* Liebm., Dansk Vet. Selsk. Skrivt. v. 2: 235, 1851.

Wafer Bay, COCOS ISLAND, *Howell No. 10187*. The illustration in *Flora Brasiliensis* might just as well have been made (even as to minute details of the spikelet) from Cocos Island material, which is without question *H. nicaraguense* of the adjacent mainland. The achenes of *No. 10187* (averaging  $2.5 \times 1.4$  mm.) are greenish with prominent raised nervation on the lower half; in age becoming opaque and brown, with corky tissue obscuring the nervation. Surface-markings and length of beak are extremely variable. The exact relationship to the Brazilian *H. amplum* has not yet been worked out.

## III. MEXICO

It is especially interesting to see adequate collections, now made by the Crocker Expedition, of the rare species *Cyperus duripes* and *Stenophyllus nesioticus*, known only from the Revillagigedo Islands.

### *Cyperus* aff. *brunneus* Sw.

*Cyperus* aff. *brunneus* Sw. Fl. Ind. Occ. 1: 116, 1797; I. M. Johnston, Proc. Cal. Acad. Sci. ser. 4, 20: 55, 1931.

ISABEL ISLAND, Mexico, *Howell No. 10528*; marine bluff, landing cove, Braithwaite Bay, SOCORRO ISLAND, *Howell No. 8415*; Mazatlan, Sinaloa, Mexico, *Howell No. 10560*; San Juanito, TRES MARIAS ISLANDS, *Howell No. 10477*. These collections from the REVILLAGIGEDO ISLANDS and the Mexican coast differ from *C. brun-*

*neus* as it occurs generally in Florida and the West Indies, in the more compact inflorescence (only in part of *No. 10528* is the inflorescence radiate), shorter and more closely flowered spikelets, shorter and smoother achenes, and somewhat narrower leaves with strongly rugose margins. These plants probably represent *C. glaucus* Steudel, a Guatemalan species described as having short rays densely and irregularly aggregated, recently treated under *C. planifolius* var. *brunneus* by Dr. Kükenthal (Pflanzenr. IV **120**: 448, 1935).

### **Cyperus duripes** Johnston

*Cyperus duripes* I. M. Johnston, Proc. Cal. Acad. ser. 4, **20**: 54, 1931.

Northern slope on summit of CLARION ISLAND above Sulphur Bay, *Howell No. 8369*; ocean bluffs, north anchorage, SOCORRO ISLAND, *Howell No. 8433*. Description of mature fruit (based on *Howell No. 8433*): achene oblong ( $1.7 \times 0.7$  mm.) trigonous with slightly concave faces, lustrous brown, the bead-like papillae more prominent than in *C. ligularis*, which has smaller achenes averaging only  $1.5 \times 0.6$  mm.

*Cyperus duripes* appears to be closer to *C. Anderssonii* of the Galapagos Islands than to *C. ligularis*, in fact the resemblance between *Howell No. 8433* and his *No. 9040* (from Indefatigable Island) is striking. All the Galapagos material representing *C. Anderssonii* shows, on a smaller scale, the same smoothness of leaves and the same beaded type of achene-surface. Since the spikelets of *C. Anderssonii* are single-fruited (achenes averaging  $1.6 \times 0.7$  mm.) (cf. Am. Journ. Bot. **22**: 269, pl.1, f.1, 1934), while those of *C. duripes* usually bear two achenes, I believe that *C. Anderssonii* is a reduced derivative of *C. duripes*. Thus we see another prominent link between the flora of the Galapagos and Revillagigedo islands.

### **Stenophyllus nesioticus** Johnston

*Stenophyllus nesioticus* Johnston, Univ. Calif. Pub. Bot. **7**: 438, 1922.

Northern slope on summit of CLARION ISLAND above Sulphur Bay, *Howell No. 8368*; dry rocky ridge west of landing cove, Braithwaite Bay, SOCORRO ISLAND, *Howell No. 8388*; dry rocky ridge west of landing cove, Braithwaite Bay, SOCORRO ISLAND, *Howell No. 8389*; dry slopes, north anchorage, SOCORRO ISLAND, *Howell No. 8454*. The mature achenes are broadly obovate ( $1.0 \times 0.9$  mm.), deep gray, rather sharply trigonous, and with a hemispheric style-base. Their small size removes *S. nesioticus* definitely from *S. junciformis* and *Bulbostylis alpestris* Kükenthal, species having achenes 1.4 mm. long, and I believe the relationship is exceedingly close to the widespread *Stenophyllus vestitus* (Kunth) Britton.

Probably because of the presence of leaf blades, which drop off in most mature material, Howell considers *No. 8389* to be a juvenile form, but it has perfectly mature achenes. Except for its glabrous culms this specimen is practically identical with *No. 10394* (*S. vestitus*) from the Mexican coast. Townsend's specimens (at the herbarium of the New York Botanical Garden) are also of the "juvenile" form.

### ***Stenophyllus vestitus* (Kunth) Britton**

*Stenophyllus vestitus* (Kunth) Britton, Bull. Torr. Club **43**: 446, 1916.

Punta Mita, Nayarit, *Howell No. 10394*. This collection is identical with *Hinton No. 4754* (herb. N. Y. Bot. Gard.) from Temascaltepec, State of Mexico, determined at Kew as *Bulbostylis vestita*. Both of these collections probably represent *Oncostylis hispida*, described by Liebmann from the middle part of Mexico and questionably differentiated by him from *O. vestita* because of capitate (i.e., non-umbellate) inflorescence. All later writers have treated the two names as synonyms.